

### **REMARKS**

Claims 1-18 were presented for examination and were rejected. The applicants respectfully request reconsideration in light of the amendments and the following comments.

Claim 2 is cancelled without prejudice, and the applicants respectfully reserve the right to re-present this claim in this or another application.

#### **Objection to Claim 10**

Claim 10 was objected to as improperly claiming a combination. The applicants respectfully submit that the objection is overcome in light of the amendments.

Claim 10, as amended, recites:

**10.** A method comprising:  
receiving, at a processor-based device, a communication that comprises at least one word; and  
classifying the communication by utilizing a ***joint classifier*** based on word information and word class information,  
wherein the joint classifier comprises at least one term-category matrix characterizing words and word classes selected using information gain based term selection.  
*(emphasis supplied)*

Because the limitation "combination of word information and word class information" has been replaced with the limitation "joint classifier," the applicants respectfully submit that the objection is overcome.

#### **35 U.S.C. § 112, Second Paragraph, Rejection of Claims 2-3**

Claims 2-3 were rejected under 35 U.S.C. § 112, Second Paragraph, because the limitation "the communication system" lacks antecedent basis.

Claim 2 has been cancelled. The applicants respectfully submit that the amendments to claim 3 overcome the rejection.

Claim 3, as amended, recites:

**3.** The method of claim 1 wherein ***the processor-based device*** routes the communication to a particular one of a plurality of destination terminals of the system based on a determined category.  
*(emphasis supplied)*

The limitation in claim 3 has been changed to “the processor-based device” from the communication system. The limitation finds antecedent basis in amended claim 1. For this reason the applicants respectfully submit that the rejection of claim 3 is overcome.

**35 U.S.C. § 112, Second Paragraph, Rejection of Claim 6**

Claim 6 was rejected under 35 U.S.C. § 112, Second Paragraph, because the limitation “each of the plurality of terms” lacks antecedent basis.

The applicants respectfully submit that the amendments to claim 6 overcome the rejection.

Claim 6, as amended, recites:

**6.** The method of claim 5 wherein the information gain based term selection determines an information gain value for each of ***a plurality of terms***, the information gain value being indicative of entropy variations over a plurality of possible categories, and being determined as a function of a perplexity computation for an associated classification task.  
*(emphasis supplied)*

The limitation in claim 6 has been changed from “the plurality of terms” to “***a*** plurality of terms.” For this reason the applicants respectfully submit that the rejection of claim 6 is overcome.

**35 U.S.C. § 112, Second Paragraph, Rejection of Claims 7-9**

Claims 7-9 were rejected under 35 U.S.C. § 112, Second Paragraph, because the limitation “each of the plurality of terms” lacks antecedent basis.

The limitations in claims 7-9 has been changed from “the plurality of terms” to “***a*** plurality of terms.” For this reason the applicants respectfully submit that the rejection of claims 7-9 is overcome.

**35 U.S.C. § 112, Second Paragraph, Rejection of Claim 12**

Claim 12 was rejected under 35 U.S.C. § 112, Second Paragraph, because the limitation "wherein the information gain based term selection" lacks antecedent basis.

The applicants respectfully submit that the amendments to claim 12 overcome the rejection.

Claim 12, as amended, recites:

**12. A method comprising:**

receiving, at a processor-based device, a communication that comprises at least one word; and

classifying the communication by utilizing a joint classifier to determine a category for the communication based on word information and word class information;

***wherein the determination of the joint classifier is based on an information gain based term selection;*** and

wherein the information gain based term selection:

- i) calculates information gain values for each word in the first communication, a given one of the terms comprising a word or a word class,
- ii) sorts the terms by their information gain values in a descending order,
- iii) sets a threshold as the information gain value corresponding to a specified percentile, and
- iv) selects the terms having an information gain value greater than or equal to the threshold.

*(emphasis supplied)*

The limitation "wherein the determination of the joint classifier is based on an information gain based term selection" has been added to claim 12. This limitation provides proper antecedent basis for the limitation "wherein the information gain based term selection." For this reason the applicants respectfully submit that the rejection of claim 12 is overcome.

**35 U.S.C. § 112, Second Paragraph, Rejection of Claim 13**

Claim 13 was rejected under 35 U.S.C. § 112, Second Paragraph, because the limitation "each of the plurality of terms" lacks antecedent basis.

The applicants respectfully submit that the amendments to claim 6 overcome the rejection.

Claim 13, as amended, recites:

**13.** The method of claim 12 wherein the selected terms are processed to form a term-category matrix utilizable by the joint classifier in determining one or more categories for ***the at least one word.***  
(emphasis supplied)

The limitation in claim 13 has been changed from "the plurality of terms" to "the at least one word." For this reason the applicants respectfully submit that the rejection of claim 13 is overcome.

**35 U.S.C. § 101 Rejection of Claims 1, 4-6, and 10-14**

Claims 1, 4-6, and 10-14 were rejected under 35 U.S.C. § 101, because they do not properly fall in a statutory category of invention.

The applicants respectfully submit that the amendments overcome the rejection.

Claim 1, as amended, recites:

**1.** A method comprising:  
receiving, ***at a processor-based device,*** a communication that comprises at least one word; and  
classifying the communication by utilizing a joint classifier based on application of word information and word class information.  
(emphasis supplied)

The limitation in claim 1 of "the processor-based device" properly places the claim within a statutory category. For this reason the applicants respectfully submit that the rejection of claim 1 is overcome.

Because claims 4-6 depend on claim 1, the applicants respectfully submit that the rejection of them is also overcome.

For the same reasons given for claim 1, the applicants respectfully submit that the rejection of claims 10-14 is also overcome.

**35 U.S.C. § 102 Rejection of Claims 1, 2, and 15-18**

Claims 1-18 were rejected under 35 U.S.C. 102(b) as being anticipated by F. Segond, et al., US Patent 6,405,162 B1 (hereinafter "Segond"). The applicants respectfully overcome the rejection.

Claim 1, as amended, recites:

**1. A method comprising:**  
receiving, at a processor-based device, a communication that comprises at least one word; and  
classifying the communication by utilizing a joint classifier based on application of **word information and word class information.**  
*(emphasis supplied)*

Nowhere does Second teach or suggest, alone or in combination with the other references, what claim 1 recites — namely the application of word information and word class information.

This distinction is important when looking at the complexities and problems of natural language processing (NLP) applications such as natural language call routing (NLCR). The present invention is aimed at the problem of routing calls using natural language systems.

One method that has been used in the prior art is the use of “word class information.” Word class information is, put simply, a statistical method of contextualizing words. Word classes are formed in order to provide context.

In natural language processing, word term classes (or clusters) are formed by clustering word terms that have some common properties or similar semantic meanings. They are regarded as more robust than word terms, because word class clustering process can be viewed as a mapping from the surface form representation in word terms to some generic concepts that should be more stable.

(Li, et al. “An Information Theoretic Approach for Using Word Cluster Information in Natural Language Call Routing,” at 1; incorporated by reference in Applicant’s Specification at page 1, line 27 through page 2, line 2; hereinafter “Li”)

Li acknowledges that word classes may not be sufficient to properly handle natural language processing issues. Specifically, Li notes, “One problem associated with word classes is that they may not be detailed enough to differentiate confusion cases in NLP tasks.” *Id.*

The present invention provides a solution, without some of the disadvantages of the prior art, in that it classifies information based on both the word class information **and** the word information.

In contrast, Second is a different solution to a subtly different problem. Both the present application and Second aim to improve natural language processing issues.

Any experience with a voice recognition system makes it quickly apparent that such systems “aren’t there yet.” Figuring out what a user means by his or her language depends on a myriad of contextual issues that both applications aim to improve.

The present application uses a combination of word information and word class information in order to improve the recognition of the meaning of user input.

Second is a rule-based system that looks to the type of information from which the word was obtained. In this, Second is different.

In semantically disambiguating words, where more than one disambiguation applies to the context in which a word occurs, **a rule can be selected based on the type of information from which it was obtained.** The rules can be derived from different types of information in a corpus such as a dictionary, and rules can be selected in accordance with a prioritization of the types of information.

(Second, Abstract; *emphasis supplied*)

The Office contends that this selection of rules based on the type of information from which it was obtained is analogous to the use of word class information. (Office Action Dated October 23, 2009, at page 9). This is not so.

The logic belying this contention is that the term “word class information” is not “defined in the claims.” (*Id.* at 2). It is not the purpose of the claims to define *terms*. The claims serve to define the scope of the *invention*.

The specification, which incorporates Li by reference (and is authored by the applicants), clearly defines the term “word class information.” See, Li at section 1, 2d paragraph. Because the term is clearly defined, the scope of the claims is clearly defined. Even when giving the claims the “broadest reasonable interpretation in view of the Specification” (Office Action at 9), it is clear that the claims do not read on Second. **If the examiner’s rejection relies on an interpretation of the “word class information” that is at odds with applicant’s explicit definition, then cite MPEP 2111.01(iv), which states that the applicant may be his own lexicographer:**

*Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. Toro Co. v. White Consolidated Industries Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999) (meaning of words used in a claim is not construed in a “lexicographic vacuum, but in the context of the specification and drawings”).*

For this reason, the applicants respectfully submit that the rejection of claim 1 is traversed.

Claim 15 recites:

**15.** An apparatus comprising:  
a processor-based device operative to:  
receive a communication that comprises at least one word; and  
to classify the communication by utilizing a joint classifier based on  
***application of word information and word class information.***  
*(emphasis supplied)*

For the reasons given with regard to claim 1, the applicants respectfully submit that the rejection of claim 15 is traversed.

Because claims 16-17 depend on claim 15, the applicants respectfully submit that the rejection of them is also traversed.

Claim 18 recites:

**18.** An article of manufacture comprising a machine-readable storage medium containing software code that when executed implements the steps of:  
  
receiving a communication that comprises at least one word; and  
classifying the communication by utilizing a joint classifier based on  
***application of word information and word class information.***  
*(emphasis supplied)*

For the reasons given with regard to claim 1, the applicants respectfully submit that the rejection of claim 18 is traversed.

### **35 U.S.C. § 103 Rejection of Claim 3**

Claim 3 was rejected under 35 U.S.C. § 103 as being unpatentable over by F. Segond, et al., US Patent 6,405,162 B1 (hereinafter "Segond") in view of C. Lee, et al., U.S. Patent 6,925,432 B2 (hereinafter "Lee"). The applicants respectfully traverse the rejection.

Because claim 3 depends on claim 1, and because Lee fails to cure the deficiencies of Segond with regard to claim 1, the applicants respectfully submit that the rejection of claim 3 is also traversed.

**35 U.S.C. § 103 Rejection of Claim 4**

Claim 4 was rejected under 35 U.S.C. § 103 as being unpatentable over by F. Segond, et al., US Patent 6,405,162 B1 (hereinafter "Segond") in view of T. Sakai, et al., U.S. Patent 7,099,819 B2 (hereinafter "Sakai"). The applicants respectfully traverse the rejection.

Because claim 4 depends on claim 1, and because Sakai fails to cure the deficiencies of Segond with regard to claim 1, the applicants respectfully submit that the rejection of claim 4 is also traversed.

**35 U.S.C. § 103 Rejection of Claims 5-6 and 10-14**

Claims 5-6 and 10-14 were rejected under 35 U.S.C. § 103 as being unpatentable over F. Segond, et al., US Patent 6,405,162 B1 (hereinafter "Segond") in view of Li. The applicants respectfully traverse the rejection.

Because claims 5-6 depend on claim 1, because of the reasons given above with regard to claim 1, and because Li fails to cure the deficiencies of Segond (as discussed above), the applicants respectfully submit that the rejection of claims 5-6 are traversed.

For the reasons given above with regard to claim 10, and because Li fails to cure the deficiencies of Segond (as discussed above), the applicants respectfully submit that the rejection of claim 10 is traversed.

Because claim 11 depends on claim 10, the applicants respectfully submit that the rejection of claim 11 is traversed.



Claim 12, as amended, recites:

**12.** A method comprising:

receiving, at a processor-based device, a communication that comprises at least one word; and

classifying the communication by utilizing a joint classifier to determine a category for the communication ***based on word information and word class information***;

wherein the determination of the joint classifier is based on an information gain based term selection; and

wherein the information gain based term selection:

- i) calculates information gain values for each word in the first communication, a given one of the terms comprising a word or a word class,
- ii) sorts the terms by their information gain values in a descending order,
- iii) sets a threshold as the information gain value corresponding to a specified percentile, and
- iv) selects the terms having an information gain value greater than or equal to the threshold.

*(emphasis supplied)*

Neither Second nor Li teach or suggest, alone or in combination, what claim 12 recites — namely the application of word information and word class information. For this reason, and the reasons given above, the applicants respectfully submit that the rejection of claim 12 is traversed.

Because claims 13-14 depend on claim 12, the applicants respectfully submit that the rejection of those claims is also traversed.

### **35 U.S.C. § 103 Rejection of Claim 7**

Claim 7 was rejected under 35 U.S.C. § 103 as being unpatentable over F. Second, et al., U.S. Patent 6,405,162 B1 (hereinafter “Second”) in view of R.F. Mihalcea, “Bootstrapping Large Sense Tagged Corpora” (hereinafter “Mihalcea”). The applicants respectfully traverse the rejection.

Because claim 7 depends on claim 1, and because Mihalcea fails to cure the deficiencies of Second, the applicants respectfully submit that the rejection of claim 7 is also traversed.

**35 U.S.C. § 103 Rejection of Claims 8-9**

Claims 8-9 were rejected under 35 U.S.C. § 103 as being unpatentable over F. Segond, et al., U.S. Patent 6,405,162 B1 (hereinafter "Segond") in view of E.K. Ringger, et al., U.S. Patent 6,606,597 B1 (hereinafter "Ringger").

Because claims 8-9 depend on claim 1, and because Ringger fails to cure the deficiencies of Segond, the applicants respectfully submit that the rejection of them is also traversed.

**Request for Reconsideration Pursuant to 37 C.F.R. 1.111**

Having responded to each and every ground for objection and rejection in the last Office action, applicants respectfully request reconsideration of the instant application pursuant to 37 CFR 1.111 and request that the Examiner allow all of the pending claims and pass the application to issue.

If there are remaining issues, the applicants respectfully request that Examiner telephone the applicants' attorney so that those issues can be resolved as quickly as possible.

Respectfully,  
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